SL2880C-E Digital Hybrid Servo Driver Manual

【*Please read the user's manual carefully before using, in order to avoid damage to the drive*】

1. Introduction

Overview

SL2880C-E is a new type of low voltage hybrid servo product based on our many years of experience in low voltage servo system. It adopts the newest DSP digital processing chip, advanced variable current technology and frequency conversion controlling algorithm which provides a high performance-price ratio solution on hybrid servo drive for equipment manufacturers. SL2880C-E has the advantages of compact structure, small volume, saving space and reducing electromagnetic interference between wires. The better vibration technology and low heating technology are adopted to effectively solve the problems of heating, vibration and noise of motor and driver. So it is low heat and environmental.

Features

◆Voltage: input voltage: 24VDC~80VDC. The recommended running voltage: 36VDC/48VDC.

◆The maximum continuous output current is 8.0A, the peak current is 13A. (of great hybrid servo overload capacity).

◆Acceptable differential and single-ended pulse / direction instructions, with three control modes of position / speed / torque.

◆Using FOC Magnetic Field Positioning Control Technology and Space Vector Pulse-Width Modulation (SVPWM) Closed-loop Control Technology.

◆Advanced variable current technology and frequency conversion technology are adopted to effectively reduce the heating of motor and drive.

◆The number of pulse per cycle can be set by debugging software or code (subdivision).

◆It has the protection functions of over-/under-voltage, over-current and tracking error over-difference.

◆Single / double pulse mode, pulse effective edge being optional (through serial port connection to the host for selection).

◆The maximum pulse frequency of the control instruction is 500khz (factory default is 200khz).

◆The electrical level of pulse, direction and enable signal input interface is 4.5 ~28V (compatible).

◆It is of serial port rs232 debugging, but need our special serial port debugging cable.

◆Performance: stable speed, small tracking error, low heating of motor and driver.

2. Performance Parameters

Electric parameters

Descriptions	SL2880C-E			
	Minimum values	Typical values	Maximum values	Unit
continuous output current	0.5	-	13	A
power voltage (DC)	24	36/48	80	Vdc
logic input current	6	10	16	mA
logic input voltage	4.5	5	28	Vdc
pulse frequency	0	200	500	kKz
high electric level width of pulse	1.5	-	-	uS
position error controlling accuracy	-	±1	-	Pulse
Speed control accuracy	-	±2	-	rpm
Max acceleration (no load)	-	100	-	rpm/ms
Overvoltage protection voltage	90	92	94	Vdc
insulation resistance	100	-	-	MΩ

Environmental parameters

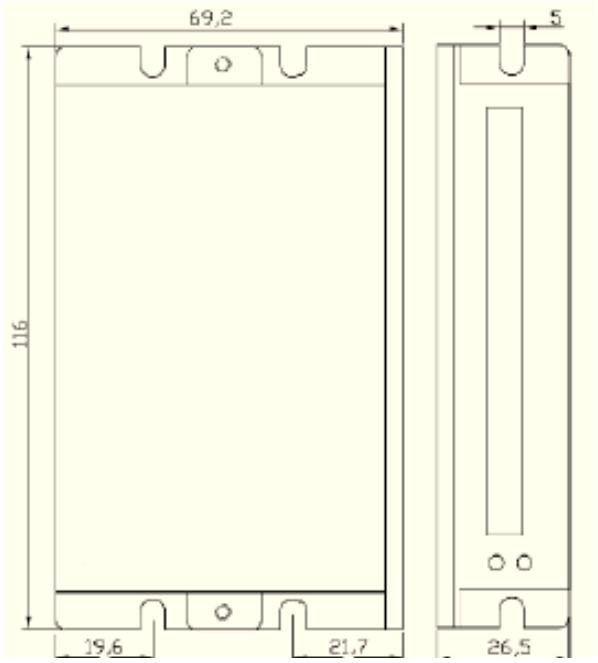
Cooling ways	Nature cooling or forced air cooling	
Service environment	Circumstances	Please keep it away from other heating equipments. Keep it away from the place with dust, oil, corrosive gases, humid and strong vibrating places. Combustible gas ans conductive dust are prohibited
	Temperature	-5℃ ~ +45℃
	Humidity	40-90% RH
	Vibration	10~55HZ/0.15mm
Storage temperature		**-20℃-+65℃**
Operation altitude		**≤1000m**
Weight		about 1.4Kg

Mechanical dimension diagram

SL2880C-E can match with Nema11/ 14/ 16/ 17/ 23/ 24/ 34 two phase hybrid servo motor. Especially for 0.3NM, 0.4NM, 0.6NM, 0.8NM, 1.0NM, 2.4NM, 3.0NM, 3.6NM, 4.5NM, 8.5NM hybrid stepper motor, its

performance is very well. The encoder is 2500 lines.

If there are customers who have special requirements for low speed vibration or high speed performance, please contact us. We will rewrite the matching motor algorithm to make the motor's performance more perfect according to the parameters.



Attentions of the heat dissipation:

The reliable working environment temperature for the drive is usually within-5 ℃ ~ 45 ℃. When the temperature of drive is near 65 ℃ or when the temperature of motor is near 70 ℃, the fan is needed to be installed nearby to forcedly dissipate the heat to ensure the temperature within the reliable running range.

3. Ports and Wiring

3.1 Ports description

Control port

Using 3.81mm interval terminals with green 8Pin.

pin	signal	function	descriptions
1	PUL+	pulse positive input port	compatible 4.5V-28V electrical level signals
2	PUL-	pulse negative input port	
3	DIR+	direction positive input port	
4	DIR-	direction negative input port	
5	ENA+	enable positive input port	
6	ENA-	enable negative input port	
7	ALM+	alarm signal positive input port	integrated electrode open circuit OC output, Max pull level is 24V, Max output current is 100mA
8	ALM-	alarm signal negative input port	

Power port 1

Using green 3Pin, 3.81mm interval screw terminals (**To Pay Attention to the Power Supply POSITIVE and NEGATIVE Pole, Do Not Connect Them Reversely!**)

pin	signal	function
1	VDC+	power input positive port, input voltage is 24-80VDC
2	GND	power input negative port
3	NC	No any signals

Power port 2

Using green 6Pin, 3.81mm interval screw terminals (**To Pay Attention to the Power Supply POSITIVE and NEGATIVE Pole, Do Not Connect Them Reversely!**)

pin	signal	function
1	EB+	encoder signal B+ input
2	EB-	encoder signal B- input
3	EA+	encoder signal A+ input
4	EA-	encoder signal A- input
5	VCC	drive +5V output, provides the power to encoder
6	EGND	drive GND output, provides the power to encoder

Serial port RS232 communication interface

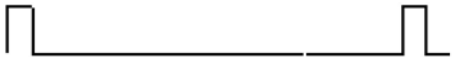
To connect the PC through the serial port transfer device and the special serial port cable(**LIVE-LINE PLUG -IN/OUT IS PROHIBITED**). Through the PC, we can not only set the function and parameters of the drive such as the subdivision, current, effective edge etc. but also can eliminate or adjust the resonance points.

pin	signal	function	descriptions
1	+5V	5V power positive terminal	only for external STU
2	TXD	RS232 sender terminal	
3	RXD	RS232 receiver terminal	
4	GND	5V power for ground	0V

Note: TS808D serial port cable must be the special cable. It can be given according to the customers requirements. Please confirm firstly before using to avoid the damage.

LED light indication

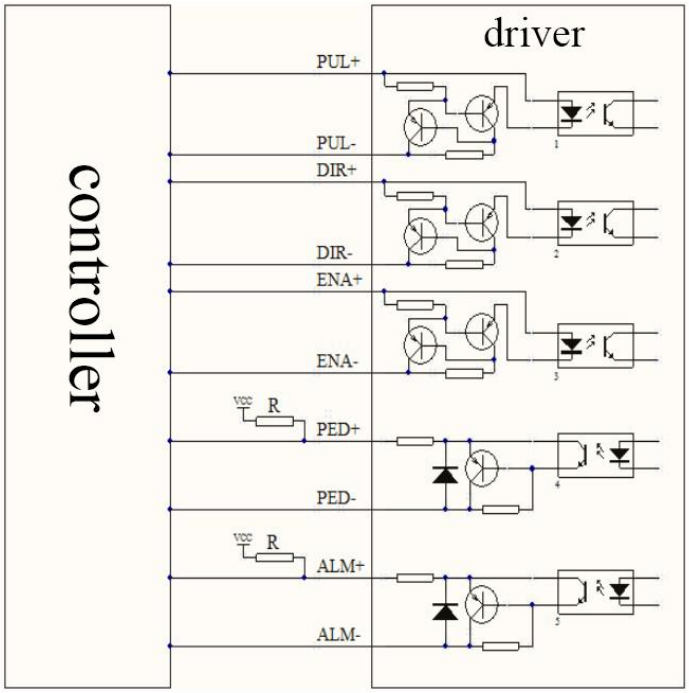
The green is the power indicator. When the driver turns on, it is normally on; when the driver turns off, it is off. The red is the fault indicator. When a fault occurs, it flashes for 5 seconds; When the fault is cleared, it is normally off. Its flash frequency is 2Hz. It is on for 200ms and off for 300ms. Within 5 seconds, the different flashing frequency means different fault. The specific relation is shown in the following table.

No.	Times	flashing waveform for red indicator	faults
1	1		over-current (I_{peak}≥25A)
2	2		over-voltage (Vdc≥90V)
3	5		tracking error over-difference

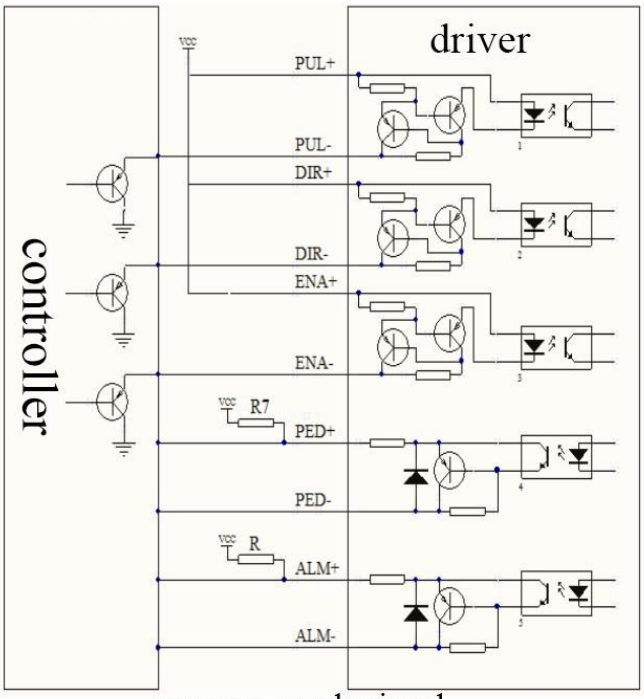
When the drive fails, the drive shuts down and prompts the appropriate fault code. The user needs to turn off the power. When it turns on again, the fault can be cleared. When the drive fails, the drive will, in queue form, save the latest faults into EEPROM of the drive. The drive will save up to 10 latest historical faults. The user can read the corresponding fault code through the PC and text display.

3.2 Control signal interface circuits

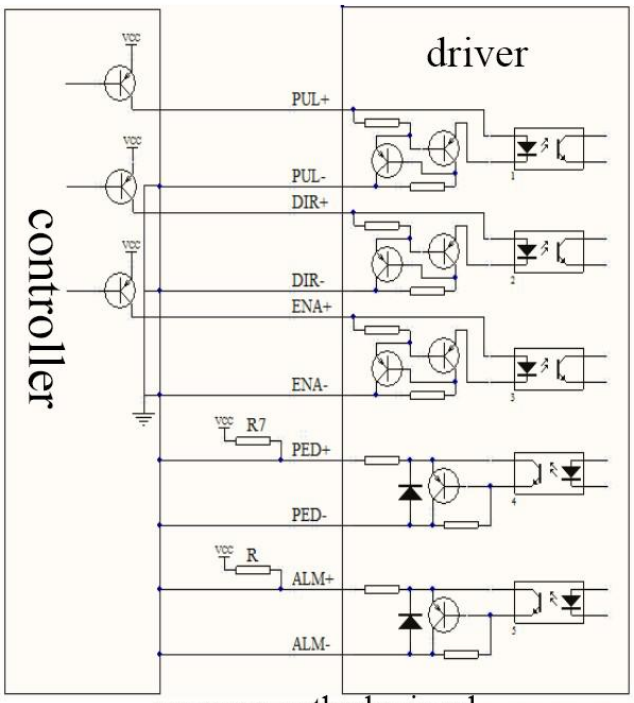
SL2880C-E driver signal input interfaces include differential signal input, common anode signal single-end input and common cathode signal single-end input, built-in high-speed photoelectric isolation coupler. the output is triode integrated electrode open-circuit OC output, the interface connection is as follows.



input signal differential connection



common anode signal
single-end input connection



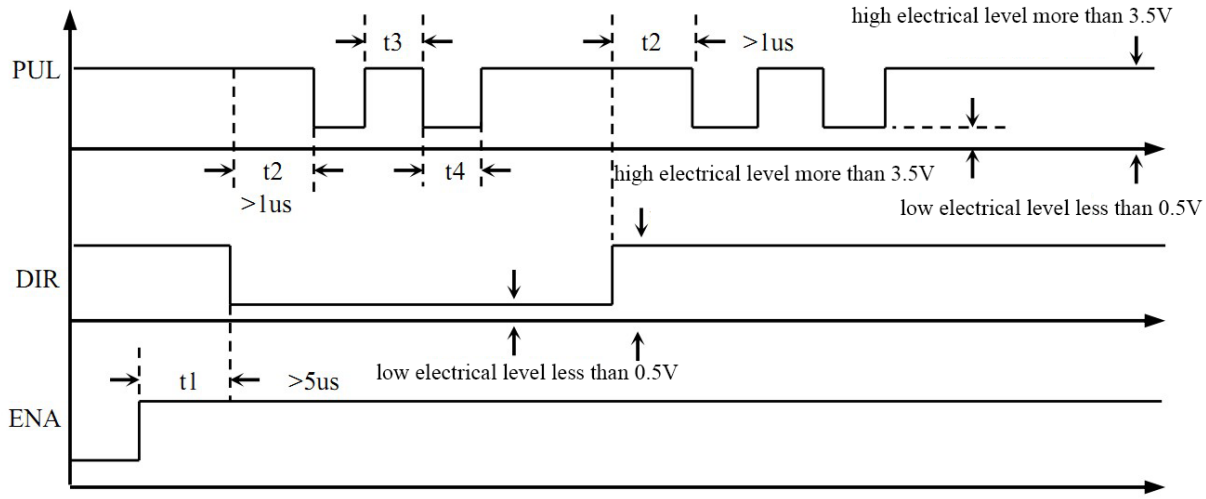
common cathode signal
single-end input connection

Notes: The voltage range of the signal input interface in the diagram is 4.5~28Vdc, whether it is the single-terminal connection or the differential connection, there is no need for series current limiting resistance. For the output interface, the external pull-up voltage is up to 28Vdc, the maximum output current is 100mA. Please select the appropriate pull-up resistance and basic parameters values according to the external pull-up

voltage. If the external pull-up voltage is 24Vdc, please select 2K pull-up resistance. If the external pull-up voltage is 12Vdc, please select 1K pull-up resistance. If it drives the relay or the motor-holding brake coil, please consult our relevant application engineer.

3.3 Control signal sequence diagram

To avoid some errors and deviations, PUL-,DIR- and ENA- should meet certain requirements, as shown in the following diagram.



control signal sequence diagram

Notes:

◆ t1: ENA (enable signal) should be at least 5μs than DIR in advance so that can be determined to be high. Generally it is suggested to be suspended.

◆ t2: DIR should be at least 1μs than PUL decline edge in advance so that whether it can be determined to be high or low.

◆ t3: The pulse width is at least not less than 1.5 μ s;

◆ t4: The low electrical level width is not less than 1.5 μ s.

3.4 Control signal mode setting

Pulse trigger edge selection: the pulse rising edge or falling edge is set to be effective through the PC software.

Single/ double pulses selection: single or double pulses are set to be valid through the PC software.

Direction selection: the initial running direction of the motor can be set through the PC software.

3.5 Wiring requirement

◆To avoid the interference in the driver, we recommend to use the shielded cable controlling signal, and short connect the shielded layer and ground wire. Except for the special requirement, the shielded wire of controlling signal cable connects ground alone; the host end of shielded wire connects ground wire and the driver end empties. For the same machine only allowing to connect ground wire at the same point. If no really connecting the ground wire, there maybe have serious disturbance. In this case, the shielded layer don't

connect the ground wire.

◆Impulse, direction signal wire and motor wire can't be wrapped side by side. The best way is to keep at least 10cm distance among them. Otherwise the motor noise easily interferes impulse direction signal to lead motor inaccurate positioning and system instability.

◆If many drivers only use one power supply, the connection should be in parallel. No allow the chain connection from one motor to another.

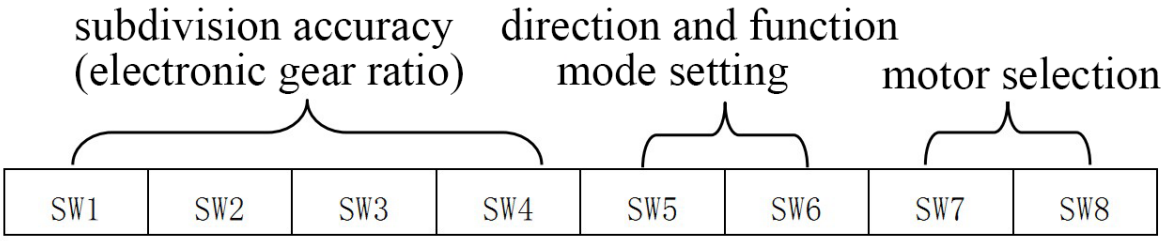
◆Forbidding to plug in/out terminal of driver when the power is still on. There are still high current flowing through the coils even though the motor with electricity cease. In this case, plugging in or out the terminals will destroy the driver because it will produce the huge instantaneous induced electromotive force.

◆Forbidding to connect the wire head added tin with connecting terminals. Otherwise the terminals maybe are destroyed owing to the resistance increasing and over fever.

◆The wiring ends shouldn't be exposed outside the terminals in case of accidentally short circuit to damage the driver.

4. Dial switch setting

SL2880C-E is the digital integrated low voltage servo driver which adopts 8-bit dial switch to set subdivision accuracy (electronic gear ratio), motor rotation initial direction, self-test and function-mode selection. The detailed description is shown as follows:



Pulse/rev	S1	S2	S3	S4
Default	On	On	On	On
800	Off	On	On	On
1600	On	Off	On	On
3200	Off	Off	On	On
6400	On	On	Off	On
12800	Off	On	Off	On
25600	On	Off	Off	On
500	Off	Off	Off	On
1000	On	On	On	Off
2000	Off	On	On	Off
4000	On	Off	On	Off
5000	Off	Off	On	Off
8000	On	On	Off	Off
10000	Off	On	Off	Off
3600	On	Off	Off	Off
7200	Off	Off	Off	Off

Subdivision accuracy (electronic gear ratio): when S1, S2, S3, S4 are all on, the driver micro-step subdivision adopts the inner default micro-step subdivision. The initial value of inner default micro-step subdivision is 400Pulse / rev. The electronic gear ratio can also be set by debugging software. SW5 sets the direction, when it is in the ON, the motor turns clockwise (CW). When it is in the OFF, the motor turns counterclockwise (CCW). SW6 sets function mode selection. When it is in the OFF, the driver is the space vector control mode (FOC). When it is in the ON, the drive is the point motion mode (PM), and it has the good efficient for start-stop mode.

SL2880C-E factory default for the matched hybrid servo motor.

Motor	SW7	SW8
SL42	ON	ON
SL57	OFF	ON
SL60	ON	OFF
Default(SL86)	OFF	OFF

Notes: for other types such as Nema11/14/16 hybrid stepper motors, it also can be matched. If needing, please contact us.

5. Protection

◆over voltage protection

When the input voltage is higher than 90Vdc, the drive will stop. User should check and solve the faults, then turn it on power again to reset.

◆under voltage protection

When the input voltage is lower than 15Vdc, the drive will stop. User should check and solve the faults, then turn it on power again to reset.

◆over current protection

When the current is over, the drive will stop. User should check and solve the faults, then turn it on power again to reset.

◆tracking error overdifference

When the tacking error overdifference occurs, the drive will stop. User should check and solve the faults, then turn it on power again to reset.

Notes: **The driver hasn't the power supply protection function of positive and negative poles connecting reversely. PLEASE RECONFIRM AGAIN THAT THE POSITIVE AND NEGATIVE POLE CONNECTING OF POWER SUPPLY IS CORRECT BEFORE TURNING ON THE POWER.THE WRONG CONNECTION WILL BURN OUT THE SAFETY TUBE OF DRIVER**.

6. Frequently asked questions (FAQ)

Methods for common faults

Faults	Possible problems	Suggestion
Motor doesn't rotate	Power indication light doesn't work	To check power circuit, keep power wire to connect well.
	Motor shaft powerless	Pulse signal is weak, to increase the signal current to 7-16mA.
	too small values of subdivision selection is be selected	To select the right subdivision
	Driver has been protected	Restart the power
	Enable signal is in the low	To pull up the enable signal or don't connect it
	No response to control signals	The power is off.
	Motor wires are cut off	To check and connect them well.
	Voltage is too high or too low	To check the power supply.
	Motor or driver is destroyed	To exchange the motor or driver
Positioning fault	Signals are interfered	To remove the interference
	Shielded ground doesn't connect or connect wrong	Reliably connect ground
	Motor wires are cut off	To check and connect them well.
	too small values of subdivision selection is be selected	To select the right subdivision
Motor speeding up failures	Speeding up time is too short	Extending the speeding up time.
	Motor torque is too small	To select a little more huge torque motor.
	Voltage is a little low	To heighten voltage appropriately

Frequently asked questions

What's the advantages of subdivision driver?

◆Reducing moved step angle degree by each step to keep each step distance evenly so as to enhance control precision.

◆Greatly reduce motor vibration. Low frequency vibration is stepper motor inherent drawback. It is the best way to remove it.

◆Efficiently reduce torque ripple and increase output torque.

Above advantages are generally admired by users, and which has given them much benefits. So we strongly recommend you to select subdivision drivers.

Why does the motor only rotate towards one direction?

◆Maybe the signals are weak, or the wrong wire connection, or too high signal voltage burn out direction current-limited resistance.

◆Pulse mode mismatches. Signal is pulse /direction, driver must set this mode; If signal is also the CW/ CCW (double pulse mode), driver must be this kind mode, or motor only rotate towards one direction.

If any other problems, please contact us.

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